Investigation of Local Compositional Uniformity in Cu$_2$ZnSn(S,Se)$_4$ Thin Film Solar Cells Prepared from Nanoparticle Inks

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Supporting Information

Figure S1: a) HAADF-TEM image showing the areas within the individual grains of the large-grain layer where EDS data were collected and b) relative standard deviations (RSD%) in the atomic percentages of the constituent elements determined from EDS. The observed compositional non-uniformity is in agreement with the STEM-EDS line scan laterally across the same region as shown in Figure 2. Please note that the measured Se/S atomic ratio is ~5, therefore the RSD% of S appears to be much larger than the RSD% of Se.

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Figure S2. HAADF-TEM images corresponding to the exact EDS line scan paths shown in Figure 4d-f, for solar cells fabricated with CZTSSe thin films annealed at 560 °C for 30 minutes, 60 minutes, and 90 minutes.